NEWS REPORT

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Utilization of Talent in America

DAEL WOLFLE*

Administrative Secretary

American Association for the Advancement of Science

SINCE World War II the nation has been increasingly concerned about its supply of scientists. Radar, the atomic bomb, wonder drugs, and other scientific discoveries and technologic inventions have focused attention on the scientist and engineer and the roles they play in both peaceful and military affairs. As with any precious resource, questions were heard about supply, about future supply, and about demand. During the years since World War II, such questions have been raised about a widening group of specialists. High birthrates forecast a future need for a greatly expanded number of school teachers; many parts of the nation have wanted more adequate medical care; and the continuing tensions of a cold war have called attention to our comparative lack of persons who are expert in the languages, customs, and current economic and political conditions of other parts of the shrinking world.

The National Academy of Sciences–National Research Council naturally was primarily interested in scientists and had demonstrated that interest by establishing the Office of Scientific Personnel. Similar questions were of interest to other councils —the American Council of Learned Societies, the American Council on Education, and the Social Science Research Council. A preliminary study had been undertaken by the Office of Scientific Personnel on the problem of human resources for advanced training with special interest in the sciences, but it soon seemed more desirable to attack this problem in the broader context of all scholarly areas. Discussions among representatives of the four councils led to agreement upon their collective responsibility for a broad study of the supply and utilization of highly trained talent in the United States. Generous grants from the Rockefeller Foundation enabled the four councils through their Conference Board of Associated Research Councils to appoint the Commission on Human Resources and Advanced Training. The Commission was established for the purpose of studying the supply of scientists, humanists, social scientists, and men and women in the other specialized professions, the demands and prospective future demands for the services of such specialists, and the supply of young persons who, with appropriate training, might become qualified members of these highly trained groups.

Members of the Commission were: Charles E. Odegaard, *Chairman*, M. H. Trytten, *Vice Chairman*, Dael Wolfle, *Direc-*

* Dr. Wolfle was Director of the Commission on Human Resources and Advanced Training from October 1950 to September 1954, after that he accepted the post of Administrative Secretary with the American Association for the Advancement of Science.

tor, Donald S. Bridgman, Aaron J. Brumbaugh, Cornelis W. de Kiewiet, E. Duncan Grizzell, Quinn McNemar, Ralph A. Sawyer, Frederick F. Stephen, Paul Webbink, Ford L. Wilkinson, and Malcolm M. Willey. In 1952 Dr. Wilkinson found it necessary to resign and was replaced by Ovid W. Eshbach. The Commission's work got under way in October 1950 and continued through September 1954. Dr. Wolfle served as director throughout those four years with the able assistance of Robert Mugge, Toby Oxtoby, Joseph G. Smith, and other staff members for various periods of time.

The major report of the Commission's work appeared in September 1954 when Harper and Brothers published *America's Resources of Specialized Talent.* Two other reports are still to appear. One, approximately ready for publication, will give the results of a follow-up study of the current earnings and occupations of bright high school graduates of some 20 years ago. With the cooperation of school officials in Illinois, Minnesota, and Rochester, New York, a sample of superior high school graduates was selected. Follow-up questionnaires determined what education each had had since leaving high school, what position each was occupying in 1953 or 1954, and what his annual earnings were at that time. Comparisons could then be made among those who had appeared equally able as high school students but who had followed different post-high-school educational patterns.

The second yet-to-be-published study deals with the personality characteristics of persons entering the sciences, law, medicine, engineering, music, and other professional fields. A considerable amount of information was secured from students who graduated in 1954 from a national sample of liberal arts colleges and professional schools. Machine analysis of the data was completed before the Commission's office closed, but the tasks of interpreting the results of the machine tabulations and writing a report were not yet done. The report is expected to be ready sometime in 1955.

Major results of the Commission's studies can be only briefly indicated since details are available in *America's Resources of Specialized Talent.* On the questions of supply and demand, perhaps the clearest result was the dearth of sound figures and the difficulty of defining the particular populations in question. It is relatively easy to count the country's physicians and school teachers; extremely difficult to count the economists and musicians; while the engineering and scientific groups lie somewhere between the two extremes. Despite all the evidence of shortages in these fields and all the interest there has been in studying the supply, considerable disagreement still exists on the number of persons actually engaged in any scientific area. One science shades gradually into another; science and engineering overlap; there are qualitative gradations within each field; and the line between the scientist or engineer and the skilled technician who works with him is a hazy one. Consequently, it is impossible to secure precise numerical expressions of the number of physicists, or geologists, or engineers in the United States. Yet estimates—as good as one can make—are of value for studying trends and for planning for the future. In either use, however, one must always remember that each figure is an estimate and that with slight changes in definitions the figures would sometimes change considerably.

With those precautions in mind, the Commission using a fairly liberal definition of scientist, estimated that in 1953 there were 237,000 scientists in the United States, and that at both the A.B. and Ph.D. levels the new recruits to science would be inadequate to meet the demand during the rest of this decade. Similarly, the Commission estimated that there were 22,000 psychologists, 633,000 engineers, 205,000 professional workers in agriculture, 185,000 in medicine, 84,000 in dentistry, and 91,000 in pharmacy. Estimates were also made in the non-science fields.

In dealing with the potential supply it was possible to discuss a number of points with more confidence than was justified in discussing the present supply. On this point the Commission's studies are clear and unequivocal: there are potentially many more competent scientists, lawyers, school teachers, historians, or members of other professional fields than we are likely to have in the years ahead. Most of the

more promising boys and girls of the Nation finish high school, but many of them do not go to college. The greater the evidence of ability on the part of a high school graduate, the greater is the likelihood that he will enter college, but at any level of ability, including the highest, a significant fraction does not. Financial handicap explains part but by no means all of this loss of superior talent. At least equally important is the fact that many bright youngsters grow up under conditions which fail to produce an interest in higher education. Home conditions, the non-academic aspirations of their fellows, school conditions which fail to arouse a real interest in intellectual development and further education, and attitudes of anti-intellectualism probably account for a greater loss than can be attributed to financial hardship.

College enrollment, therefore, would be much larger than it is now if every qualified high school graduate entered college; and, as a consequence, in the years ahead there would be comparably more people trained for careers in medicine, engineering, science, the humanities, and other specialized fields. Just how great the increase would be would depend upon the size of the increase in college attendance among those qualified for such work. Approximately two-thirds of the top 2 percent of high school graduates now graduate from college; approximately one-half of the top 16 percent of high school graduates graduate from college; and approximately one-third of the top half of high school graduates graduate from college. There may well be argument as to whether all of the top half of high school graduates should go through college, but there would probably be no argument over the suggestion that the talents of all or practically all of the top 2 percent, or 16 percent, or 25 percent would be better utilized with advanced education than without it.

The possibility of college education for a larger fraction of the ablest young men and women raises the question of how they would be employed after college. The same question is raised by the fact that college graduating classes will inevitably be much larger in size, although not necessarily higher in average quality, as a result of the increased birthrates during and since World War II. Since no one knows just what the future demands will be in any particular field, naturally there are fears that we may train too many persons for some fields.

The Commission gave a good deal of attention to this problem and conducted one survey which provided relevant information. The study consisted of a follow-up of a sample of college graduates to determine the current occupational distribution of persons who had majored in each of the specialized fields. Graduates of medical and dental schools almost always practice those professions; but graduates in most other fields scatter out into a wide range of professional fields. College graduates who majored in chemistry sometimes become business men; some of those who majored in psychology become engineers; some of those who majored in engineering become agricultural experts. Naturally, the greater shifts, such as from English to engineering, are less frequent than the smaller ones, such as from mathematics to engineering. But in total, an impressive amount of occupational flexibility was found among the nation's educated labor force. The process, which was highlighted by the wartime recruitment of persons from many fields for work on electronic and nuclear development projects, goes on more slowly at all times and constitutes one of the major mechanisms by which educated persons adapt themselves to changing occupational demands.

In view of the substantial amount of occupational mobility, and in the firm belief that there can never be an oversupply of top level talent, the Commission strongly favored all practicable means of interesting a larger fraction of the ablest high school graduates in securing advanced education. It is not possible now to predict exactly how they will be employed in the future, but their talents can be better utilized and they can be of greater service to society with advanced education than without it.

As the Commission on Human Resources and Advanced Training brought its studies to a close, it was able to look with satisfaction at the great growth of interest in the field of its special concern which had taken

place during the Commission's lifetime. The Commission was not, of course, solely responsible for the increased interest, although it did have a hand in stimulating wider interest. In the early days the Commission received much welcome assistance from the United States Office of Education, the United States Bureau of Labor Statistics, the Office of Scientific Personnel, the University of Minnesota, and a few other institutions which had already developed active interest in the problems of specialized talent. More recent expressions of this interest are found in a methodological study of the prediction of demand being carried out by the National Bureau of Economic Research; in the well-developed programs of manpower studies within the American Council of Learned Societies, the Engineering Manpower Commission, and the National Science Foundation; and in the creation of the Scientific Manpower Commission and the Cabinet committee on scientific personnel.

The Educational Testing Service at Princeton, N. J., accepted custodial responsibility for much of the Commission's basic data. These data will be available to others interested in certain kinds of studies which the Commission did not have time to make and may provide the starting point for a follow-up study of what has happened to college graduates of 1954 for whom college major, ability measures, and a number of personal characteristics are recorded.

In its final report to the Conference Board of Associated Research Councils, the Commission suggested that in a few years the Conference Board review the general problems which led it to create the Commission in order to decide then whether or not another study seems desirable. One of the Commission's greatest assets was the fact that it could examine the whole specialized manpower problem, not engineers alone, or chemists alone, or personnel of interest to a particular agency or employer, but the whole problem of supply and utilization of educated talent. If at some time in the future such a study again seems desirable, the Conference Board will be an appropriate sponsoring agency. If such a future study is carried out, it will be able to draw upon the experience and data of many more specialized studies than were available when the Commission began its work in 1950, and should be able to answer more satisfactorily than could the Commission some of the pressing problems concerning specialized talent in the United States.

Advisory Committee on International Technologic Assistance

FREDERICK M. FEIKER

Technical Director of the Committee

SEVERAL paragraphs of President Wilson's Executive Order of May 11, 1918, requesting that the National Academy of Sciences perpetuate the National Research Council, contain phrases which have particular significance as a statement of policy for the establishment of the Advisory Committee on International Technologic Assistance by the National Academy of Sciences–National Research Council. These phrases —"to promote cooperation in research, at home *and abroad*;" "to serve as a means of bringing American and *foreign* investigators into active cooperation;" and "to gather and collate scientific and technical information, at home *and abroad*"—indicate that the group of scientists and professional engineers who early envisioned the oppor-

tunity for service of the Academy–Research Council visualized the international as well as the national scope of this voluntary aid to our Government.

Because the machinery of cooperation and the deeper purposes of the National Research Council had thus been established in the early days of the first World War, it was natural that the United States Department of State should turn for ex parte advice to the Academy–Research Council for the solution of technical questions involving our relations with other nations which face us as an aftermath of the second World War. Conversations between representatives of the Technical Cooperation Administration (TCA) of the Department of State and the Academy–Research Council resulted in July 1951 in a basic contract. In July 1953, the basic contract was renewed by the Foreign Operations Administration (FOA) which took over this function of the TCA.

The basic contract outlines in legal phraseology the general concept that the Foreign Operations Administration will call upon the Academy–Research Council for professional advice on international technologic problems within the competence of the membership of the Academy–Research Council, that the advisory services of individuals serving on panels and committees shall be given by the individual without compensation, and that the operating costs for staff, office facilities, travel and per diem expenses, etc., shall be budgeted and paid under specific task orders issued under the basic contract.

The administration of the contract was placed in the Division of Engineering and Industrial Research of the National Research Council and for the first year the Chairman and Executive Committee of the Division served as an overall advisory committee. This procedure enabled the officers of the Division to observe the type and variety of requests which were received so that an overall advisory committee could be chosen with more understanding of the basis of need.

The basic contract, signed in 1951, was not implemented by a task order until the spring of 1952 when the first request for advisory service on the construction of a fixed nitrogen plant in Pakistan was received. This request, the first of several involving advice on the production of fertilizers, established broadly a policy of handling such requests, namely, the appointment of a panel of experts; the employment, if necessary, of staff or project directors; and the formalization of the method of presenting the final reports. For this first request the Chairman of the Division of Engineering and Industrial Research appointed Russell McBride, James A. Barr, and B. D. Van Evera to serve as a panel, and they recommended the employment of C. O. Brown as general consultant. L. L. Newman of the United States Bureau of Mines served as a special consultant on fuels. The recommendations of the panel and the reports of the consultants were delivered to the Technical Cooperation Administration on September 12, 1952.

Requests from the Government of Jordan for a plan for the economic exploitation of the mineral and chemical resources of the Dead Sea and from the Government of Lebanon for advice on the establishment of an industrial research institute, transmitted to the Academy–Research Council by the Technical Cooperation Administration, were quite different in character and called for somewhat different procedures. For the first, a small panel was appointed consisting of Walter L. Badger, R. E. Gage, Charles Lowe, and Paul M. Tyler, staff metallurgist of the National Research Council. The problem was primarily one of bringing together as much information as possible from government sources, and Dr. Tyler compiled and analyzed this available material which was forwarded to TCA with the comments of the panel on September 8, 1952. The request from Lebanon was even more specialized. Advice was sought on how best to organize a research agency in Lebanon. A staff report was prepared by Eugene Scott who circulated it to an advisory group of research administrators for their comments and recommendations, and the staff report with these comments was forwarded to TCA on November 7, 1952.

Early in 1952, conversations with representatives of TCA and the Government of

India resulted in a task order requesting advice on the technological problems involved in the proposed expansion of the fertilizer plant at Sindri, India. This request called for advice and counsel not only on the technical aspects of the production of different types of fertilizers, but also on the choice of the kind of fertilizer best suited to the Indian needs. As a consequence, a special panel was assembled consisting of the panel members who had served as advisors on the Pakistan fertilizer plant with the addition of George H. Holbrook. Cooperating with the panel was Frank Parker, specialist in fertilizers with the United States Department of Agriculture. The conclusions of the panel presented to TCA on September 18, 1952, called attention especially to the difficult technical problems inherent in the manufacture of urea. The Indian Government requested further information on these problems; and, under the direction of the same panel, two additional reports were prepared. One, a supplement to the first report, was forwarded to TCA on December 4, 1952, and a more extensive final report based on a world-wide inspection of urea plants was delivered on October 1, 1953. The inspection trip was made under the direction of the panel, one of whose members, Dr. Van Evera, accepted the responsibility of technical counsellor. Three representatives of the Indian Government traveled with Dr. Van Evera. The report by Dr. Van Evera to FOA was made through the panel as part of the final report presented on October 1, 1953.

The year's experience outlined above indicated the general nature of the requests and the character of the personnel required for the formation of an advisory committee. In the spring of 1953, the following persons accepted appointment as members of the overall Advisory Committee on International Technologic Assistance:

Harold V. Bozell, former President, General Telephone Company of New York, *Chairman*

Robert M. Gates, President, Air Preheater Corporation of New York

Thomas H. MacDonald, Texas Engineering Experiment Station and former Commissioner of the U. S. Bureau of Public Roads

Harold S. Osborne, former Chief Engineer, American Telephone and Telegraph Company

William J. Sparks, Chairman, Division of Chemistry and Chemical Technology

Frederick M. Feiker, *Technical Director.*

Under the guidance of this Committee, during the years 1953–54, a series of requests were reviewed and procedures were recommended for their fulfillment. The time required for the various advisory reports naturally varied in accordance with the scope of the problem, but in general the task orders were established on the basis of one year.

The first request for technologic advice to come before the Committee during the year 1953–54 concerned the utilization of waste gases in Saudi Arabia. The Committee met on November 18, 1953, and after discussion accepted the responsibilities described in the task order. Before appointing a special advisory panel for this problem, the Chairman, Mr. Bozell, and Dr. Gates met with representatives of the Arabian American Oil Company (Aramco) to discuss the technological aspects of the problem which had already been considered by Aramco in its development of the petroleum resources of Saudi Arabia. The Aramco representatives cooperated fully in furnishing the basic information.

James A. Barr, mining engineer and fertilizer expert, was appointed Project Director and Samuel H. Manian, Associate Project Director. As is the case with all panels, scientific and technical advisory boards, and committees of the Academy–Research Council, the members are chosen for their specialized knowledge and do not serve as representatives of the organizations or agencies by which they are employed. The special advisory panel appointed for this problem was composed of the following members:

Harold S. Osborne, former Chief Engineer, American Telephone and Telegraph Company, *Chairman*

Robert L. Bateman, Manager, Fine Chemicals Division, Carbide and Carbon Chemical Company

Harry A. Curtis, Director, Tennessee Valley Authority

E. DeGolyer, Consulting Geologist, Dallas, Texas

Mayor F. Fogler, Vice President, Allied Chemical and Dye Corporation

Max A. McCall, Operations Research Office, Johns Hopkins University

Joseph Pope, Stone and Webster Engineering Corporation

Henry Gardiner Symonds, Tennessee Gas Transmission Company, with J. J. King of the same company serving as alternate

R. B. Wittenberg, General Manager, Chemical Division, General Tire and Rubber Corporation.

Three meetings of the panel were held in Washington. At the first meeting, the members of the panel suggested areas for the use of waste gases which might be profitably investigated by the staff. At the next two meetings the panel reviewed the very complete technical analysis made by the staff and from the staff report recommended several types of developments believed the best to meet the problem presented in the original task order. The final report was delivered to FOA on July 14, 1954, and at the present time FOA is planning for its wide distribution.

The next project to be accepted by the Committee was in the nature of an emergency and called for technologic advice on the establishment of a fertilizer plant in Korea. Because of the fact that a large amount of special knowledge had been gathered on fertilizer manufacture for previous projects, it was possible to assemble a panel promptly and to forward the necessary staff work essential to the panel's consideration of the problem. A special advisory panel was appointed with the following membership:

E. R. Gilliland, Professor of Chemical Enginering, Massachusetts Institute of Technology, *Chairman*

James A. Barr, Consulting Mining Engineer and Fertilizer Expert, Mt. Pleasant, Tenn.

Briant F. Branting, Nitrogen Division, Allied Chemical and Dye Corporation

Owen Cooper, Mississippi Chemical Company

Philip H. Groggins, Consulting Chemical Engineer, Washington, D. C.

G. E. Hilbert, Agricultural Research Service, U. S. Department of Agriculture

B. D. Van Evera, Professor of Chemistry and Coordinator of Science Activities, The George Washington University.

Samuel Manian was made Project Director. Thanks to the cooperation of the Chairman and members of the panel, a draft report of the panel recommendations was presented to FOA in December, approximately three months after the signing of the task order and the final staff report with the recommendations of the panel is now nearing completion.

During 1954, one other task order was received from FOA concerning recommendations for additional equipment to facilitate research in twelve national regional laboratories in India. Preliminary to the formation of a special panel to consider this problem, the Committee deemed it advisable to survey the present facilities in India first hand. C. S. Piggot, a member of the National Academy of Sciences, accepted the appointment of Project Director and Technical Commissioner to undertake the survey and is now in India.

Probably only in retrospect can the pioneers in the promotion of ideas be sure that the concepts they visualized have borne fruit. The examples of international cooperation in the solution of technological problems described in this brief summary demonstrate that the purposes and services of the Academy–Research Council, conceived and formally expressed in 1918, are being translated into action.

HIGHWAY RESEARCH BOARD ANNUAL MEETING

The thirty-fourth annual meeting of the Highway Research Board was held at the Academy–Research Council during the week of January 10. There was a record attendance, notable for the wide representation of its participants, including approximately 30 foreign visitors from Canada, Denmark, England, Germany, Finland, Japan, and some of the Latin American countries.

Almost 200 papers and reports were presented by research workers from various State highway departments, universities and colleges, Federal agencies, trade associations, manufacturing companies, highway consulting groups, foundations, and local county and city highway departments. In the course of the meeting there were 38 technical sessions and 62 committee meetings.

At the opening session, Detlev W. Bronk, President of the National Academy, greeted the delegates and visitors on behalf of the Academy–Research Council and urged the highway researchers to continue the fundamental research to which the Academy–Research Council is dedicated.

As one of the oldest continuing organizations of the Academy–Research Council, the Highway Research Board serves as a clearinghouse for highway research information and its annual meetings provide an opportunity for scientists and engineers to present their findings to other experts working in the broad field of highway research. The papers presented at the technical sessions ranged in subject from design and construction of roads to technical problems in soils and materials, traffic and vehicle operation, night-time vision and sign legibility, and the important economic, psychological, and sociological problems of transportation and modern urban development.

One of the highlights of the annual meeting was the presentation of awards. This year Roy W. Crum Distinguished Service Awards were conferred upon Ralph A. Moyer, a professor at the Institute of Transportation and Traffic Engineering of the University of California and former chairman of the Highway Research Board's executive committee; Burton W. Marsh, director of the Safety and Traffic Engineering Department of the American Automobile Association and former chairman of the Board's executive committee; and posthumously upon the late Walter H. Root, former chairman of the Board's executive committee and deputy chief engineer of the Iowa State Highway Commission.

FOOD AND NUTRITION BOARD STATEMENT ON VITAMIN-MINERAL PREPARATIONS

In response to a request from the U. S. Commissioner of the Food and Drug Administration, the Food and Nutrition Board studied the question of whether vitamin preparations dispensed to the public for dietary supplementation should be subject to formulation of definitions and standards of identity.

In its statement to the Food and Drug Administration, the Board emphasized its position that ordinarily the recommended nutrient allowances can be readily obtained from a good variety of common foods and that vitamin or mineral supplements are not needed. However, the Board recognized that individuals under certain conditions (reduced appetite, bizarre or faulty food habits) may possibly, for limited times, benefit from such supplements.

The industries making and distributing vitamin preparations were encouraged to consider the composition of their products as being in accord with the Board's *Recommended Dietary Allowances.* In view of the lack of information on the need, production, and distribution of such preparations, the Board did not see fit to recommend that definitions and standards of identity be prepared.

LECTURE BY ANDRE M. LWOFF

The third lecture in the Academy–Research Council series was given on December 21 by André M. Lwoff, Head of the Department of Microbial Physiology, Institut Pasteur, Paris, France. The title of the lecture was "Control and Interrelation of Metabolic and Viral Diseases of Bacteria."

Dr. Lwoff pointed out that textbooks make no reference to the fact that bacteria are subject to diseases. Usually, disease is thought to result in the damage or destruction of some vital function. The diseases of bacteria, however, may result also in increased or abnormal synthetic processes within the cell.

In some instances bacteria synthesize compounds which kill themselves as well as other sensitive strains. The exposure of *Escherichia coli* to ultraviolet light and nitrogen mustards causes the formation of a protein particulate called colicin in the cell. One particle of colicin can kill one bacterium. Here we have a fatal disease manifested by the synthesis of protein within the cell.

There are a number of similarities between colicin and phage. Their formation is induced by the same agents, the action of colicin appears to be similar to that of the "ghosts" of T-2 phage. This phage, which is the agent of a typical infectious disease of bacteria, will leave a ghost or shell which is capable of killing a bacterium even though infection by the ghost does not result in the formation of new phage particles.

Ordinarily, phage infection is transmitted from one bacterium to another by means of phage particles. However, evidence indicates that in certain instances the infection or phage comes from a precursor or prophage.

What is prophage? It seems to be a specific, noninfective particle. In lysogenic bacteria there is evidence of one prophage for each bacterial mutant. The prophage particle apparently is located at a specific site in the bacterial chromosome.

One cannot escape the conclusion that prophage is an intermediate unit between the genetic material of bacteria and the genetic material of phage. Therefore prophage may develop as a by-product of the normal processes of rearrangement of genetic material in bacteria. This work raises for viruses the question of spontaneous generation which was ruled out for living organisms in general by Pasteur many years ago.

Thus, virus diseases may appropriately be considered as diseases of bacterial metabolism—diseases of unbalanced syntheses resulting in the formation of phage, bacteriocins, and similar products which destroy the host and its associates.

LECTURE BY JOEL H. HILDEBRAND

On Tuesday, December 7, Joel H. Hildebrand, Professor Emeritus of the University of California and President of the American Chemical Society presented a lecture on "Acids and Bases" as part of the regular Academy–Research Council lecture series.

Although the 18th century definition of an acid as a substance containing oxygen (Lavoisier and others) can be extended to give a useful description of certain geological and metallurgical oxide systems, it is of limited applicability. A more general definition of acids as proton donors and of bases as proton acceptors, developed by Brønsted and Lowry (1923) in the light of Berzelius' theory of electrodualism, freed the concept of acids and bases from dependence on particular anions (hydroxyl in the water and ammonia systems, halide in hydrogen halide systems), but it was not applicable to systems involving no proton exchange. In 1939, G. N. Lewis eliminated the dependence of acid-base systems on proton exchange by defining acids as electron acceptors and bases as electron donors. This general definition extended the acid-base concepts to include compounds such as ferric chloride and boron trifluoride but, until recently, could not be applied quantitatively to organic solvent systems.

Dr. Hildebrand went on to describe experiments, including his own, which permit quantitative estimates of the acid (or base) strengths of various organic compounds, including olefinic and aromatic systems and

chelate complexes. In particular, Dr. Hildebrand's curiosity about the color changes of iodine in different polar and non-polar solvents led and his co-workers to ultra-violet adsorption measurements that correlated remarkably well with the Lewis scheme, paving the way for further theoretical and practical investigations.

AMERICAN GEOLOGICAL INSTITUTE

The administrative officers of the member societies of the American Geological Institute met together for the first time at Tulsa, Okla., on December 4, 1954. Since the business offices of the member societies have many problems in common, there was a growing feeling that the executive secretaries could improve their usefulness and value to the governing boards and memberships of the societies they served by getting together once or twice a year to pool ideas and experiences.

At the Tulsa meeting the group discussed such problems as editing and printing; mailing of publications and other printed matter; address files and changes of address; general mailing problems; convention problems, including planning, services during conventions, and post-convention duties; collection of dues and maintenance of membership records; budgets and accounting; and legal problems. A second meeting of administrative officers is planned for the spring.

INTERNATIONAL UNION OF THE PHYSIOLOGICAL SCIENCES

On December 5, 1954, the Governing Board of the Academy–Research Council voted to adhere on behalf of the physiologists of the United States to the newly formed International Union of the Physiological Sciences. In following up this action the Academy–Research Council has paid the 1954 dues to the Secretary of the Union and is proceeding to establish a United States National Committee to deal with matters pertaining to United States participation in the Union.

Membership of the United States National Committee for the International Union of the Physiological Sciences will be constituted as follows: three representatives of the American Physiological Society, three representatives of the American Society for Pharmacology and Experimental Therapeutics, two representatives of the Society of General Physiologists, and one member-at-large to be selected by the Academy–Research Council. In addition all officers of the Union residing in the United States will be ex officio members of the Committee.

Officers of the Union, elected in 1953, are C. H. Best (Canada) *President* and Maurice B. Visscher (United States) *Secretary*. Members of the Council of the Union include the officers and the following: E. D. Adrian (England), K. M. Bykov (USSR), C. Heymans (Belgium), B. A. Houssay (Argentina), Y. Kuno (Japan), E. Lundsgaard (Denmark), A. Mayer (France), A. von Muralt (Switzerland), and H. H. Weber (Germany).

INTERNATIONAL ARID LANDS SYMPOSIUM-CONFERENCE

The American Association for the Advancement of Science (AAAS) has announced the names of foreign participants in the symposium-conference scheduled for April 26–May 4, 1955, at Albuquerque and Socorro, N. Mex. The Southwestern and Rocky Mountain Division of the AAAS, in cooperation with the National Association, has completed plans for the meetings which will be held in conjunction with the Ninth Session of the Unesco International Advisory Committee on Arid Zone Research.

The following foreign participants will attend: George Aubert (France), Edward Bowen (Australia), Hugo Boyko (Israel), C. S. Christian (Australia), Alfonso Contreras Arias (Mexico), B. T. Dickson (Australia), F. Dixey (England), Col. Omar Draz (Egypt), Michael Evanari (Israel), Theodore Monod (French West Africa), Carlos Muñoz (Chile), Kanwar Sain (India), Hilgard O'Reilly Sternberg (Brazil), Jean Tixeront (Tunisia), B. P. Uvarov (England), C. C. Wallen (Sweden), and R. O. Whyte (Italy).

Three special evening lectures will serve as an integral part of the symposium and inform the general public of the importance and challenge of arid lands research and development. Homer L. Shantz of Santa Barbara, Calif., will speak on the "History

of Arid Zone Development and the Problems and Potentialities of Arid Lands;" Charles E. Kellogg of the United States Department of Agriculture will discuss the "Current Status of Arid Zone Research and Development;" and B. T. Dickson, formerly with the Commonwealth Scientific and Industrial Research Organization at Canberra, Australia, will present "The Challenge of Arid Land Research and Development for the Benefit of Mankind."

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS

The twelfth meeting of the Bureau of the International Council of Scientific Unions (ICSU) will be held in Washington, D. C., March 7–12. W. Albert Noyes, Jr., Treasurer of ICSU and Dean of the Graduate School at the University of Rochester, is in charge of arrangements. Plans for the meeting are being handled by the Office of International Relations of the Academy–Research Council with the active cooperation of the United States Department of State and the National Science Foundation.

The tentative program for the 6-day session includes three days of Bureau meetings, a joint meeting of the Bureau with the Academy–Research Council Committee on International Scientific Unions, a special meeting of the Bureau with representatives of the National Academy of Sciences and the National Science Foundation, and an excursion to the University of Virginia. Several social functions are planned for the week.

Members of the Bureau planning to attend the meeting in Washington are: B. Lindblad, Stockholm Observatory, Sweden, *President;* A. von Muralt, University of Berne, Switzerland, *Past President;* H. Solberg, University of Oslo, Norway, *Vice President;* Colonel E. Herbays, Engineer, Belgium, *Vice President;* A. V. Hill, University College of London, England, *Secretary General;* W. Albert Noyes, Jr., *Treasurer;* J. Pérès, Institut de Calcul Blaise Pascal, France, *Member;* and N. Kameyama, University of Tokyo, Japan, *Member.* In addition to the regular members of the Bureau, Ronald Fraser, Administrative Secretary of ICSU will attend.

COMMITTEE ON A NATIONAL ATLAS

For some time there has been much interest among geographers in producing a national atlas of the United States similar to the Atlas of France and the forthcoming Atlas of Canada. Several committees appointed by the Association of American Geographers and the American Geographical Society have investigated the problem and concluded that a loose-leaf atlas would be the only feasible type at this time. The Association of American Geographers asked the Division of Earth Sciences to organize a committee to investigate the ways and means of producing the atlas. Finally, on December 17, 1954, the Committee on a National Atlas was established with the following membership:

Carleton P. Barnes, U. S. Agricultural Research Service, *Chairman*
Col. J. D. Abell, Army Map Service
James R. Anderson, U. S. Agricultural Research Service
Clarence E. Batchelet, U. S. Bureau of the Census
Anthony P. Dean, U. S. Forest Service
Herman R. Friis, U. S. Archives
Arch C. Gerlach, Library of Congress
Charles B. Hitchcock, American Geographical Society
Arnold C. Orvedal, U. S. Soil Conservation Service
Col. Richard Philbrick, U. S. Air Force Aeronautical Chart and Information Service
Louis O. Quam, Office of Naval Research
John C. Reed, U. S. Geological Survey
Herbert C. Thom, U. S. Weather Bureau.

CONFERENCE ON RED CELL METABOLISM

If blood is to be stockpiled, or if blood banks are to maintain reserves adequate for civil defense requirements, the period of storage must be extended far beyond the 3-week limit achieved during World War II. In the blood stream, the normal red cell lives for about 120 days, but in storage at body temperature it dies in 3 or 4. The best evidence indicates that the integrity of the cell depends upon maintenance of its normal metabolism, and that outside of the body some critical imbalance develops in a relatively short time. Refrigeration and the addition of acid-citrate-dextrose (ACD) solution, which is nutritive as well as anti-coagulant, delay this process con-

siderably, but after 3 weeks a rapid disintegration sets in. Until the metabolic requirements of the red cell and the changes which ocur in storage are better understood, the search for more effective methods of preservation will remain largely empirical.

With this in mind, the Subcommittee on Blood and Related Problems sponsored a Conference on Red Cell Metabolism on November 19 and 20, 1954. Recent advances in research on protein, lipid, carbohydrate, and nucleotide metabolism, on oxidative and glycolytic mechanisms, and on the so-called storage lesion were reported and discussed in the hope of discovering new approaches to the problem of preservation. Particular interest was shown in the fact that adenosine, when added to blood in conjunction with the standard ACD solution, was found to promote the resynthesis of organic phosphates by the cells and to prolong their survival under normal storage conditions by 3 or 4 weeks. Another promising technique, though apparently farther from the point of practical application, was that of freezing red cells in glycerol at —80° C., which essentially arrests diffusion as well as metabolism.

COMMITTEE ON CLIMATOLOGY ADVISORY TO THE WEATHER BUREAU

At the request of the U. S. Weather Bureau, the Academy–Research Council has formed a Committee on Climatology to advise the Bureau on its climatological activities. Specifically, the Committee will meet with Helmut E. Landsberg, Head of the Climatology Division of the Bureau, to discuss some of the problems and proposed changes for the Division. The Committee plans to meet once during the current year and probably twice in 1956.

The Committee approved by the Academy–Research Council consists of the following members:

THOMAS F. MALONE, Massachusetts Institute of Technology, *Chairman*
WERNER A. BAUM, Florida State University
PHIL E. CHURCH, University of Washington at Seattle
A. O. KUHN, University of Maryland
J. H. LONGWELL, University of Missouri.

COMMITTEE ON AGRICULTURAL PESTS

Among the recommendations which have come to the Agricultural Board through the Agricultural Research Institute (ARI), the one given the greatest emphasis by the ARI membership was that the Board give attention to the problems of plant diseases, weeds, nematodes, and other agricultural pests.

Accordingly, a Committee on Agricultural Pests was established and held its first meeting on November 15 and 16, 1954. The membership of the Committee is as follows:

GEORGE C. DECKER, University of Illinois, *Chairman*
H. L. HALLER, U. S. Department of Agriculture (chemicals)
J. H. KING, University of Minnesota (plant diseases)
W. E. LOOMIS, Iowa State College of Agriculture (weeds)
R. L. METCALF, University of California (insects)
G. STEINER, U. S. Department of Agriculture (nematodes)
H. C. YOUNG, Ohio State Agricultural Experiment Station (plant diseases).

For its initial program the Committee proposes to undertake studies on *1*) losses and economics, 2) the hazards of use of pesticides, and 3) systemics and antibiotics.

SYMPOSIUM ON SOLAR ECLIPSES AND THE IONOSPHERE

A special international symposium on solar eclipses and the ionosphere will be held August 22-24, 1955, at The Royal Society, London, under the sponsorship of the Joint Commission on the Ionosphere of the International Council of Scientific Unions (ICSU).

The Joint Commission consists of representatives of the International Unions of Scientific Radio (four members), Geodesy and Geophysics (four members), Astronomy (three members), and Pure and Applied Physics (two members). The Commission meets at least once every two years. An example of the activities of this Joint Commission is the resolution adopted at its second meeting in 1950, urging the Executive Board of ICSU to set up a special committee to plan an International Geophysical Year to be carried out in 1957–58.

This resolution was acted upon, and the ICSU Special Committee for the International Geophysical Year was established.

Those interested in attending the symposium sponsored by the Joint Commission are invited to communicate with Dr. W. J. G. Beynon, Secretary of the Joint Commission on the Ionosphere, Department of Physics, University College of Swansea, Singleton Park, Swansea, Wales.

SPECIAL MEETING DIVISION OF MEDICAL SCIENCES

At the request of the membership, the Division of Medical Sciences held a special meeting on November 29, 1954, to discuss its responsibilities to the cooperating societies and, conversely, their role in divisional affairs.

There was lively interest in the potential role of the Academy–Research Council as an interpreter of science for the general public and as a forum in which the views of the scientific community can be formulated and made known. It was agreed that the significant problems are interdisciplinary in nature, and President Bronk suggested that the National Research Council might meet as a whole to explore these questions. With respect to other functions, there was hearty approval of existing policies.

Another purpose of the meeting was to invite suggestions as to how the members and their societies might participate more actively in divisional affairs. In recent years, closer relationships have been achieved by appointing the majority of the members of the Division to advisory committees and by inaugurating a quarterly news letter. At this meeting it was concluded that little more could be accomplished by formal means, but that the societies and individual members should be encouraged to offer comments and recommendations on their own initiative.

Consideration was also given to the suggestion, made at the last annual meeting, that the societies might wish to contribute funds for the Division's program of unrestricted fellowships in the medical sciences to counteract in some degree the trend toward categorized research. While the sums available might be small, it was agreed that the moral backing of the societies would strengthen the Division's hand in seeking other support and that the members should explore the possibility with their respective organizations.

STAFF APPOINTMENTS

The Materials Advisory Board has announced the appointment of **Max C. Farmer,** formerly with the Aluminum Company of America, as staff metallurgist effective November 29, 1954. Mr. Farmer will be working on titanium and related problems.

Ray E. Bollen, formerly testing engineer for the Nebraska Department of Roads and Irrigation, has been appointed a staff engineer of the Highway Research Board and will represent the Departments of Materials and Construction and of Maintenance. Mr. Bollen is assuming the duties of **Elmer M. Ward,** now Assistant Director of the Board.

Glenn A. Greathouse, Director of the Prevention of Deterioration Center since its formation in 1945, has resigned to devote his full time to research. Dr. Greathouse has established the Orlando Research, Inc., in Orlando, Fla., to undertake research on chemical, radiochemical, biochemical, biophysical, and related problems.

The Division of Chemistry and Chemical Technology has announced the appointment of **Carl J. Wessel** as the new Director of the Prevention of Deterioration Center effective January 1. Dr. Wessel has been associated with the Center since 1946. Before that he taught chemistry at the University of Detroit and Wayne University and was on the staff of the R. P. Scherer Corporation of Detroit, Mich.

C. D. Gull became Administrative Officer of the Division of Engineering and Industrial Research on December 1, 1954. Mr. Gull has been developing improved bibliographic controls for scientific and technical reports of Government-sponsored research and development. He was formerly associated with Documentation, Inc., and with the Library of Congress where he served as Deputy Chief of the Union Catalog Division and of the Catalog Maintenance Division.

RECORD OF MEETINGS

November	
1	Subcommittee on Waste Disposal
	American Geological Institute, Committee on Government Relations
	American Geological Institute, Committee on Education and Public Relations
2	American Geological Institute, Committee on Professional Relations
	American Geological Institute, Executive Committee
	Committee on Veterans Medical Problems
3	Ad hoc Conference on Thorotrast Follow-up Studies
	Committee on Fabrics for Body Armor, *Natick, Mass.*
4	Committee on Amino Acids
	Committee on Definitions and Standards of Identity for Foods
	Food and Nutrition Board, Executive Committee
	Committee on Nuclear Science, Subcommittee on Units, Symbols, and Nomenclature
5	Committee on Nuclear Science
	American Geophysical Union, Pacific Northwest Regional Meeting, *Portland, Ore.*
	Committee on Flame and Thermal Protective Combat Clothing, *Natick, Mass.*
	Committee on Foreign Research Scientists Program
5–6	Food and Nutrition Board
5–7	Committee on Disaster Studies, *Battle Creek, Mich.*
6–7	Division of Biology and Agriculture, Executive Committee
8	Federal Construction Council, Task Group T-12
8–9	Subcommittee on Fruits and Vegetables, *Chicago, Ill.*
9	Nuclear Data Seminar
10	Material Advisory Board, Executive Committee
13–14	Division of Biology and Agriculture, Committee on Educational Policies
	Biology Council
15	Panel on Malaria
	American Institute of Biological Sciences, Committee on Publications
15–16	Committee on Agricultural Pests
17	Ad hoc Committee on Uniform Taxonomy Coding

November	
17	Committee on Ship Steel, Project Advisory Committee SR-139
	Subcommittee on Stress
18	Committee on Guard Rails and Guide Posts
	Panel on Blood Coagulation
	Subcommittee on Water Supply
	Ad hoc Panel on Establishment of a Hemoglobin Standard
	Committee on Training and Research in Applied Mathematics, *Princeton, N. J.*
19	Division of Mathematics, Executive Committee, *Princeton, N.J.*
	Subcommittee on Atmospheric and Industrial Hygiene
	Subcommittee on Radiation Sterilization
	Federal Construction Council, Task Group T-11
	Subcommittee on Blood and Related Problems
19–20	Conference on Red Cell Metabolism
20	Advisory Screening Comittee on Fulbright Fellowships in Mathematics
22	Institute of Animal Resources
	Committee on Psychiatry
23	Panel on Rubber
	Industry Advisory Committee on Failures in Built-up Roofs
	Ad hoc Panel on Glycerol Pectate
	Nuclear Data Seminar
26	Maritime Cargo Transportation Conference
27–28	Committee on Animal Nutrition, *Chicago, Ill.*
29	Subcommittee on Food Technology, *Ithaca, N.Y.*
	Federal Committee on Construction Products Center
	Division of Medical Sciences, Executive Committee
	Division of Medical Sciences, Special Meeting
29–30	Committee on Undersea Warfare, *New London, Conn.*
30	Committee on Medicine and Surgery
	Maritime Cargo Transportation Conference, Board of Advisors
	Committee on Development of Substitutes for Waterfowl Feathers and Down, *Boston, Mass.*

December	
1	Federal Construction Council, Task Group T-13
	Advisory Committee on International Technologic Assistance, Panel on Korea
	Advisory Committee on Artificial Limbs, Panel on Lower Extremity Research and Development, *Berkeley, Calif.*
2	Advisory Committee on Artificial Limbs, Panel on Upper Extremity Research and Development, *Berkeley, Calif.*
	Building Research Advisory Board, Executive Committee
2–3	Panel on Primary Batteries, *Buffalo, N.Y.*
3	Committee on Disaster Studies
	Committee on Foods, Subcommittee on Acceptance, *Chicago, Ill.*
4	Pacific Science Board Annual Meeting
	American Geological Institute, Administrative Officers of Member Societies, *Tulsa, Okla.*
	Division of Earth Sciencies, Executive Committee
4–5	Committee on Child Development
5	National Academy of Sciences–National Research Council, Governing Board
6	Committee on International Exchange of Persons
	Advisory Screening Committee on Fulbright Fellowships in Physical Sciences
7	Federal Construction Council, Operating Committee
	Nuclear Data Seminar
8	Panel on Reinforced Aircraft Plastics
	Committee on Foods, Subcommittee on General Products, *Chicago, Ill.*
8–10	Special Committee on Effects of Military Aircraft on Airfield Pavements, *Jacksonville, Fla.*
9	Building Research Institute, Conference on Modular Coordination
9–10	Committee on Containers, *Chicago, Ill.*
10	Building Research Institute, Board of Governors Executive Committee
	Planning Committee for the Conference on the Production of Physicists, *New York City*
10–11	Advisory Screening Committee on Fulbright Fellowships in Biology and Agriculture

December	
11	Advisory Screening Committee on Fulbright Fellowships in Chemistry
11–12	Committee on Growth, Executive Committee and Panel Chairmen
	Committee on Growth, Section on Biochemistry and Panels on Cytochemistry, General Biochemistry, Metabolism, and Nutrition; Section on Biology and Panels on Genetics, Morphogenesis, Virology and Immunology; Section on Endocrinology; Section on Pharmacology and Panels on Chemotherapy and Environmental Cancer; and Section on Physiology and Panels on Cellular Physiology, Physics, and Radiobiology
12	Division of Chemistry and Chemical Technology, Annual Meeting
	USA National Committee, International Union of Biological Sciences
13	Advisory Screening Committee on Fulbright Fellowships in Earth Sciences
	Division of Medical Sciences, Subcommittee on Personnel and Training
14	Subcommittee on Climatic Chambers, *Natick, Mass.*
	Advisory Screening Committee on Fulbright Fellowships in Medical Sciences
	Committee on Sanitary Engineering and Environment
15	Materials Advisory Board, End-Use Pattern Group
16	Subcommittee on Cereals & Baked Products, *Chicago, Ill.*
	Committee on Ship Steel, Project Advisory Committees SR-130 and SR-137
	Panel on Corundum
17	Subcommittee on Hand Functioning and Handwear, *Natick, Mass.*
	Committee on Nuclear Science, Subcommittee on Instruments and Techniques, *Chicago, Ill.*
21	Federal Construction Council, Task Group T-9
	Nuclear Data Seminar
29	Federal Construction Council, Operating Committee
	American Geological Institute, Committee on Education, *New York City*
30	Ad hoc Committee Advisory to the Food and Drug Administration

NEW PUBLICATIONS

Atlas of Tumor Pathology. Section VI, Fasc. 22–23. *Tumors of the Retroperitoneum, Mesentery, and Peritoneum,* by Lauren V. Ackerman. 1954. 136 p. $1.50. Washington, D. C., American Registry of Pathology, Armed Forces Institute of Pathology.

Atoll Research Bulletin. Nos. 31–32 (bound in one volume). Pacific Science Board, National Academy of Sciences–National Research Council. November 1954. [130] p.

Atoll Research Bulletin. Nos. 33–36 (bound in one volume). Pacific Science Board, National Academy of Sciences–National Research Council. November 1954. [180] p.

Color in Foods. A symposium sponsored by the Quartermaster Food and Container Institute for the Armed Forces Quartermaster Research and Development Command. U.S. Army Quartermaster Corps. Oriental Institute, University of Chicago. November 3–4, 1953. 186 p. (Available from the Quartermaster Food and Container Institute for the Armed Forces, Chicago).

Committee on Growth of the National Academy of Sciences–National Research Council. Eighth Annual Report to the American Cancer Society, Inc., July 1952–June 1953. [1954]. 300 p.

Cooperating Societies, National Academy of Sciences–National Research Council. Officers and Meetings. Revised December 1954. 44 p. Library, National Academy of Sciences–National Research Council.

Deleterious Constituents of Indiana Gravels. Highway Research Board Bulletin 94. Academy–Council Publication No. 342. 1954. 10 p. $0.30.

Effect of Water on Bitumen–Aggregate Mixtures. Highway Research Board Bibliography 17. Academy–Council Publication No. 332. 1954. 45 p. $0.60.

Final Report on a Survey of Training and Research in Applied Mathematics in the United States. Conducted by the National Research Council under contract with the National Science Foundation. [1954]. 60 p. (Available from the National Science Foundation, Washington).

Highway Accidents and Related Factors. Highway Research Board Bulletin 91. Academy–Council Publication No. 334. 1954. 54 p. $0.75.

Highway-User Taxation. Highway Research Board Bulletin 92. Academy–Council Publication No. 340. 1954. 48 p. $0.75.

Mass Differences, a Compilation of Experimental Atomic Mass Differences found from Beta Decay, Reaction Energies, Microwave Data, Alpha Decay, and Mass Doublets. Nuclear Science Series Report Number 16. Academy–Council Publication No. 336. [1954]. $1.50. (Reprinted from *Reviews of Modern Physics,* v. 26, No. 4, pp. 327–472, Oct. 1954.)

Pacific Science Board of the National Academy of Sciences–National Research Council, Seventh Annual Report, 1953. [1954]. 93 p.

Sodium-Restricted Diets, the Rationale, Complications, and Practical Aspects of Their Use. Academy–Council Publication No. 325. 1954. 71 p. $1.00.

Soil Density and Stability. Highway Research Board Bulletin 93. Academy–Council Publication No. 341. 1954. 64 p. $0.90.

State Highway Organization Charts. Highway Research Board Special Report 20. Academy–Council Publication No. 352. 1954. 51 p. $0.75.

Notice of Academy Meetings

NATIONAL ACADEMY OF SCIENCES

Annual Meeting, Washington, D. C., April 25–27, 1955

Autumn Meeting, California Institute of Technology, *dates to be announced*

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

Governing Board, Washington, D. C., February 13, 1955

Governing Board, Washington, D. C., April 24, 1955

Governing Board, Washington, D. C., June 19, 1955

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